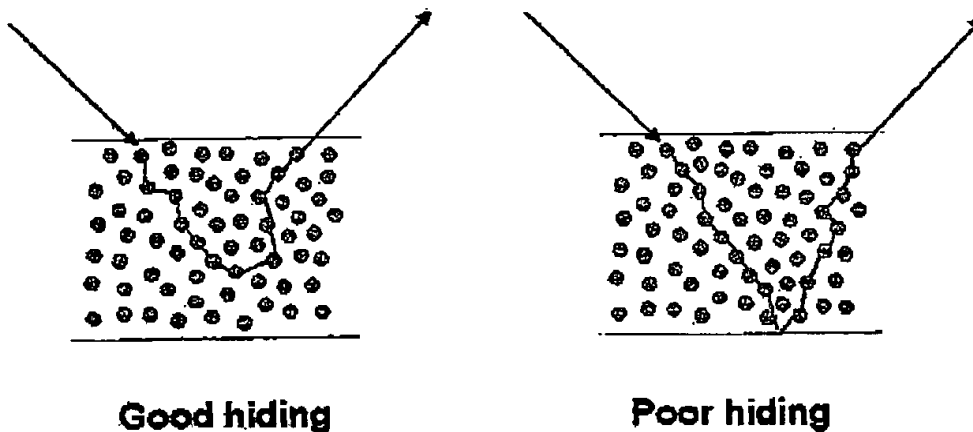


Pigments are what give coatings their beautiful colors. There are a wide variety of colors in coatings today so let's talk about the different types of pigments and how they are used. The main categories for the pigments used in coatings are inorganic, organic, metallic, and pearlescent. When choosing a pigment for a particular coating some of the factors involved are:

- Refractive index
- Hiding efficiency
- Color
- pH
- Bulking value
- Density
- Hardness
- Oil absorption
- Impermeability (barrier properties)

The idea behind the pigment is to provide color and protect the substrate. To give color to a coating the pigment must create an opacity in the coating. When a coating is opaque the pigment particles present scatter and/or absorb light sufficiently to prevent it from reaching the substrate. Whether or not the pigment imparts opacity is dependant on two characteristic properties: refractive index and particle size. As you can see by the diagram below if the particles do not have a high refractive index, change the direction the light is traveling, there is insufficient hiding of the substrate. Therefore one can still see the substrate. There is a limit to the number of pigment particles in a coating based on the pigment volume concentration (PVC). This is why it is important to have pigment particles with a high refractive index.



Based on the refractive index pigments can be separated into two main categories: hiding and extender pigments.

Hiding pigments:

These pigments possess refractive index values greater than 1.5. Examples of hiding pigments include titanium dioxide, zinc oxide, lithophone, and antimony oxide.

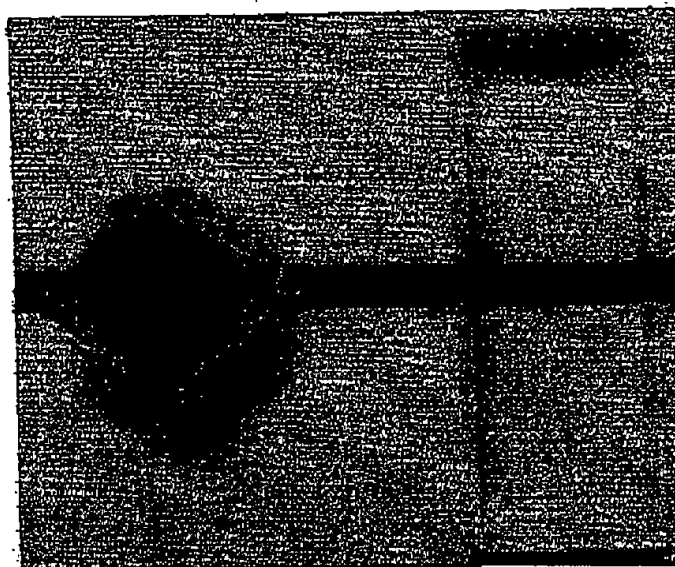
Extender pigments:

These pigments possess refractive index values close to 1.5. Examples of extender pigments include calcium carbonate, silicas, alkali and alkaline earth metal silicates, and barytes.

As said before particle size also has an effect on the effectiveness of the pigment. As the particle size of a pigment decreases, its opacifying ability increases. As shown figure below, a block of glass is transparent while a stack of thin glass slides of the same overall thickness has opacifying ability. Similarly, a large crystal of titanium dioxide appears colorless, but pigment grade titanium dioxide has good opacifying ability.

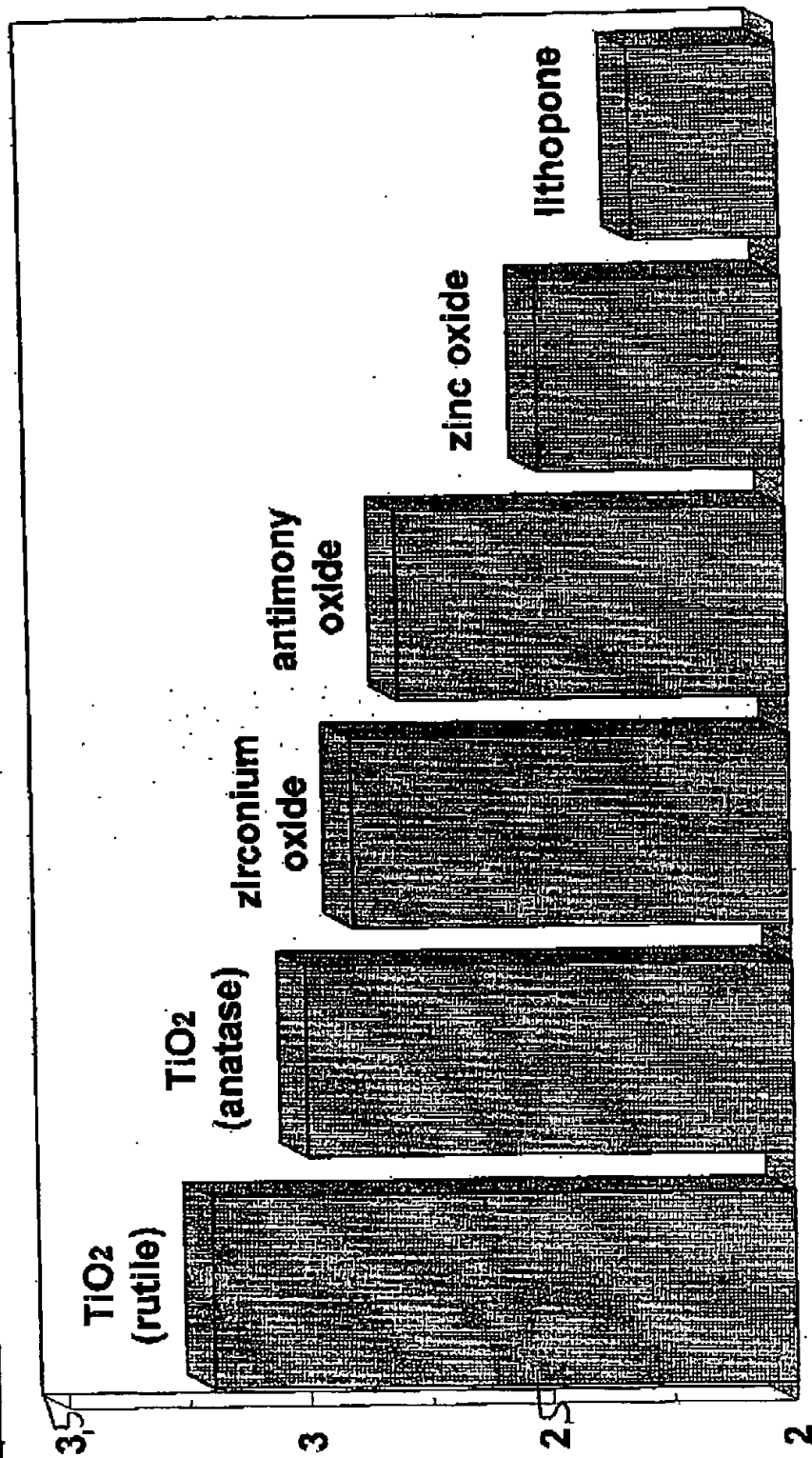
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Refractive Index of White Pigments



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